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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	George H. BuAbbud, et al.
Serial No.:	09/540,955
Filing Date:	March 31, 2000
Group Art Unit:	2633
Examiner:	Shi K. Li
Title:	BIDIRECTIONAL FREQUENCY SHIFT CODING USING TWO DIFFERENT CODES FOR UPSTREAM AND DOWNSTREAM

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

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PATENT APPLICATION
09/540,955

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Dear Sir:

REPLY BRIEF

In response to the Examiner's Answer dated June 27, 2005, Applicant respectfully submits this reply brief to address matters raised in the Examiner's Answer.

REAL PARTY IN INTEREST

The present Application was assigned to Marconi Communications, a Delaware corporation, as indicated by an assignment from the inventors recorded on March 31, 2000 in the Assignment Records of the United States Patent and Trademark Office at Reel 010733, Frames 0258-0260. The Application was assigned by Marconi Communications to Marconi Intellectual Property (Ringfence) Inc., a Delaware corporation, as indicated by an assignment recorded on November 5, 2003 in the Assignment Records of the U.S. Patent and Trademark Office at Reel 014646, Frames 0607-0610. The Application was assigned by Marconi Communications to Marconi Intellectual Property (Ringfence) Inc. to Advanced Fibre Access Corporation, a Delaware corporation, as indicated by an assignment recorded on April 21, 2004 in the Assignment Records of the U.S. Patent and Trademark Office at Reel 014532, Frames 0723-0730. Advanced Fibre Access Corporation changed its name to Tellabs Bedford Inc. a Delaware corporation, as indicated by a Change of Name document recorded on July 15, 2005 in the Assignment Records of the U.S. Patent and Trademark Office at Reel 016269, Frames 0577-0584.

RELATED APPEALS AND INTERFERENCES

There are no known appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this pending appeal.

STATUS OF CLAIMS

Claims 3, 4, 6, 7, and 10-21 stand rejected pursuant to a Final Action mailed August 11, 2004. Claims 1, 2, 5, 8, and 9 have been canceled without prejudice or disclaimer. Claims 3, 4, 6, 7, and 10-21 are all presented for appeal.

STATUS OF AMENDMENTS

No response was filed to the Final Action of August 11, 2004. No additional amendments have been made to the claims. A Notice of Appeal was filed on November 11, 2004. The Appeal Brief was filed on February 15, 2005. The Examiner's Answer was mailed on June 27, 2005.

SUMMARY OF CLAIMED SUBJECT MATTER

Each of the independent claims include limitations for transmitting data over an optical fiber in a first direction in a first data code at a selected wavelength flight (e.g., non-return to zero ("NRZ") data) and transmitting data over the optical fiber in a second direction in a second data code at the selected wavelength of light (e.g., Manchester data). A concise explanation of the subject matter of each of the independent claims follows. Citations in the sections below refer to the specification and drawings as filed.

Independent Claim 3

Independent claim 3 claims a method of transmitting bidirectional communication data over a single optical fiber. The first limitation comprises transmitting a first NRZ data stream (see, e.g., pg. 11, ll. 11-13) having a first clocking frequency (see, e.g., pg. 11, ll. 13-14, providing an example 25 MHz frequency) from a first location to a second location (see, e.g., Fig. 4, HDT 18 and ONU 20; pg. 12, ll. 9-14) by

said optical fiber using a carrier having a selected wavelength of light (see, e.g., Fig. 4, fiber 42A, and pg. 11, ll. 17-24, providing an example 1310 nanometer light wave).

The second limitation comprises receiving said selected wavelength of light from said first location at said second location and recovering said NRZ data stream (see, e.g., Fig. 4, ONU 20, and pg. 11, ln. 25 - pg. 12, ln. 6).

The third limitation comprises receiving a second NRZ data stream having said first clocking frequency at said second location (see, e.g., Fig. 4, ONU 20; pg. 12, ll. 22-27, receiving an example 25 MHz NRZ data stream).

The fourth limitation comprises converting said second NRZ data stream to a Manchester coded data stream at a second clocking frequency which is a selected multiple of said first clocking frequency (see, e.g., Figs. 5A - 5D; pg. 13, ll. 3-10; pg. 14, ll. 19-23, providing example Manchester coded data having frequencies of 50 MHz and 75 MHz).

The fifth limitation comprises transmitting said Manchester coded data stream from said second location to said first location by said optical fiber at said selected wavelength of light (see, e.g. Fig. 4, ONU 20, fiber 42A and HDT 18; pg. 14, ln. 23 - pg. 15, ln. 2).

The sixth limitation comprises receiving said Manchester coded data stream at said first location (see, e.g., Fig. 4, HDT 18, photodiode 55; pg. 14, ln. 26 - pg. 15, ln. 2).

The last limitation comprises converting said Manchester coded data stream to an NRZ data stream having said first frequency (see, e.g., pg. 15, ll. 2-4).

In this claimed method of claim 3, the second clocking frequency is three times (3x) said first clocking frequency, and the Manchester coded data stream includes three (3) pulses for each data bit. Additionally, a voting of said three (3)

pulses to determine at least two (2) equivalent pulses and providing an output NRZ data bit at said first frequency equivalent to said at least two (2) equivalent Manchester data bits is performed (see, e.g., Figs. 5A - 5D; pg. 13, ll. 4-24).

Independent Claim 7

Independent claim 7 claims an apparatus for transmitting bidirectional communication data over a single optical fiber. The apparatus includes a first data source for providing a first electrical digital data stream coded as an NRZ data stream and at a selected clocking pulse rate (see, e.g., Fig. 4, HDT 18, conductor 68; pg. 11, ll. 11-15).

The apparatus also includes a first light generator at a first location for generating light at a selected wavelength, said light generator connected to said first data source for receiving said NRZ coded data stream and for modulating light generated by said first light generator with said NRZ coded data (see, e.g., Fig. 4, laser driver 67 and laser diode 68; pg. 11, ll. 17-20).

The apparatus also includes an optical fiber extending from said first location to a second location for transmitting bidirectional light there between (see, e.g., Fig. 4, fiber 42A).

The apparatus also includes a first light detection device at said second location for receiving said light modulated by said NRZ coded data stream and for recovering said NRZ coded electrical digital data stream (see, e.g., Fig. 4, ONU 20 and photodiode 59; pg. 11, ln. 25 - pg. 12, ln. 3).

The apparatus also includes a second data source for providing a second electrical digital data stream coded as an NRZ data stream at said selected clocking pulse rate (see,

e.g., Fig. 4, ONU 20, conductor 100 conducting 25 MHz NRZ data).

The apparatus also includes a source for providing clocking pulses at said selected clocking pulse rate (see, e.g., Fig. 4, conductor 114).

The apparatus also includes a clock multiplier for multiplying said selected clocking pulse rate at least three times (3x) (see, e.g., Fig. 4, clock multiplier 116; pg. 14, ll. 19 -22).

The apparatus also includes a Manchester coding device connected to said clock multiplier for receiving said NRZ coded data stream and for converting said NRZ coded data stream at said selected clocking pulse rate to a Manchester coded data stream having pulses at a clocking pulse rate at least three times (3x) said selected clocking pulse rate (see, e.g., Fig. 4, Manchester encoder 102; pg. 14, ll. 21-23).

The apparatus also includes a second light generator at said second location for generating light at said selected wavelength, said second light generator connected for receiving said Manchester coded electrical digital data stream and for modulating light generated by said second light generator with said Manchester coded data stream (see, e.g., Fig. 4, laser driver 122 and photo diode 61; pg. 14, ll. 22-26).

The apparatus also includes a second light detection device at said first location for receiving said light modulated by said Manchester coded electrical digital data stream and for recovering said Manchester coded electrical digital data stream (see, e.g., photo diode 55, pg. 14, ln. 26 - pg. 15, ln. 2).

The apparatus also includes a Manchester decoding device for receiving said Manchester coded electrical digital data

stream and converting said received data stream to an NRZ coded data stream at said selected clocking pulse rate (see, e.g., Manchester decoder 130; pg. 15, ll. 2-4).

The Manchester coded data stream of claim 7 includes three (3) pulses for each data bit and the Manchester decoding device is adapted to vote the three (3) pulses to determine at least two (2) equivalent pulses and provides an output NRZ data bit at the selected clocking pulse rate equivalent to the at least two (2) equivalent Manchester data bits (see, e.g., Figs. 5A - 5D; pg. 13, ll. 4-24).

<u>Independent Claim 12</u>

Independent claim 12 claims a method of bidirectional communication over a single optical fiber. The first limitation comprises transmitting over the optical fiber in a first direction first digital data in a first data code at a first clock frequency and at a first wavelength (see, e.g., pg. 11, ll. 11-14, conductor 68 providing example first NRZ data at a 25 MHz frequency; Fig. 4, fiber 42A, and pg. 11, ll. 17-24, providing an example 1310 nanometer light wave).

The second limitation comprises converting second digital data in the first data code to a second data code at a second clock frequency, the second clock frequency a multiple of the first clock frequency (see, e.g., Fig. 4, conductor 100, clock multiplier 116 and Manchester encoder 102, providing second NRZ digital data and converting it to Manchester encoded data at 75 MHz; pg. 14, ln. 19-23).

The third limitation comprises transmitting over the optical fiber in a second direction the second digital data in the second data code at the second clock frequency and at the first wavelength (see, e.g., Fig. 4, fiber 42A; pg. 14, ln. 23 - pg. 15, ln. 2).

The last limitation comprises converting the second digital data from the second data code to the first data code by setting each bit of the second digital data in the first data code equal to a majority of corresponding bits of the second digital data in the second data code (see, e.g., Fig. 4, Manchester decoding and voting circuit 130; Figs. 5A - 5D; pg. 13, ll. 4-24).

Independent Claim 16

Independent claim 16 claims a system for bidirectional communication over a single optical fiber.

A first means-plus-function element comprises means for transmitting over the optical fiber in a first direction first digital data in a first data code at a first clock frequency and at a first wavelength. The corresponding structure for performing the recited function comprises the laser driver 67 and the laser diode 68 of Fig. 4, and as described at pg. 11, ll. 17-20.

A second means-plus-function element comprises means for converting second digital data in the first data code to a second data code at a second clock frequency, the second clock frequency a multiple of the first clock frequency. The corresponding structure for performing the recited function comprises the clock multiplier 116 and Manchester encoder 102 of Fig. 4, and as described at pg. 14, ll. 19-23.

A third means-plus-function element comprises means for transmitting over the optical fiber in a second direction the second digital data in the second data code at the second clock frequency and at the first wavelength. The corresponding structure for performing the recited function comprises the laser driver 122 and laser diode 61 of Fig. 4, and as described at pg. 14, ll. 23-26.

A fourth means-plus-function element comprises means for converting the second digital data from the second data code to the first data code by setting each bit of the second digital data in the first data code equal to a majority of corresponding bits of the second digital data in the second data code, The corresponding structure for performing the recited function comprises the quantizer 128 and Manchester decoding and voting circuit 130, and as described at pg. 15, ll. 2-6.

<u>Independent Claim 17</u>

Independent claim 17 claims a method of bidirectional communication over a single optical fiber. The first limitation comprises transmitting over the optical fiber in a first direction and at a first wavelength first digital data in a first data code (see, e.g., pg. 11, ll. 11-14, conductor 68 providing example first NRZ data at a 25 MHz frequency; Fig. 4, fiber 42A, and pg. 11, ll. 17-24, providing an example 1310 nanometer light wave).

The second limitation comprises converting second digital data in the first data code to a second data code so that the power spectrum of the second digital data in the second data code is substantially separated from the power spectrum of the first digital data in the first data code (see, e.g., Fig. 4, conductor 100, clock multiplier 116 and Manchester encoder 102, providing second NRZ digital data and converting it to Manchester encoded data at 75 MHz; pg. 13, ln. 24 - pg. 14, ln. 23).

The third limitation comprises including multiple corresponding data bits in the second digital data in the second data code for each data bit of the second digital data

in the first data code (see, e.g., Figs. 5A - 5D; pg. 13, ll. 3-23).

The fourth limitation comprises transmitting over the optical fiber in a second direction and at the first wavelength the second digital data in the second data code (see, e.g., Fig. 4, fiber 42A; pg. 14, ln. 23 - pg. 15, ln. 2).

The fifth limitation comprises converting the second digital data from the second data code to the first data code by setting each corresponding data bit of the second digital data in the first data code equal to a majority of equivalent bits in the multiple corresponding data bits in the second data code (see, e.g., Figs. 5A - 5D; pg. 13, ll. 3-23).

Independent Claim 20

Independent claim 20 claims a system for bidirectional communication over a single optical fiber. The system includes a first transmitter circuit configured to transmit over the optical fiber in a first direction and at a first wavelength first digital data in a first data code (see, e.g., Fig. 4, laser driver 67 and laser diode 68; pg. 11, ll. 17-20).

The system also includes a first converting circuit configured to convert second digital data in the first data code to a second data code so that the power spectrum of the second digital data in the second data code is substantially separated from the first digital data in the first data code and to include multiple corresponding data bits in the second digital data in the second data code (see, e.g., Fig. 4, clock multiplier 116 and Manchester encoder 102; pg. 13, ln. 24 - pg. 14, ln. 23).

The system also includes a second transmitter circuit configured to transmit over the optical fiber in a second direction and at the first wavelength the second digital data in the second data code (see, e.g., Fig. 4, laser driver 122 and laser diode 61; pg. 14, ll. 23-26).

The system also includes a receiver circuit configured to receive the second digital data in the second data code and convert the second digital data from the second data code to the first data code by setting each corresponding data bit of the second digital data in the first data code equal to a majority of equivalent bits in the multiple corresponding data bits in the second data code (see, e.g., Fig. 4, quantizer 128 and Manchester decoding and voting circuit 130; pg. 15, n. 2-6).

Independent Claim 21

Independent claim 21 claims a method of transmitting bidirectional communication data over a single optical fiber. The first limitation comprises transmitting a first NRZ data stream (see, e.g., pg. 11, n. 11-13) having a first clocking frequency (see, e.g., pg. 11, n. 13-14, providing an example 25 MHz frequency) from a first location to a second location (see, e.g., Fig. 4, HDT 18 and ONU 20; pg. 12, n. 9-14) by said optical fiber using a carrier having a selected wavelength of light (see, e.g., Fig. 4, fiber 42A, and pg. 11, n. 17-24, providing an example 1310 nanometer light wave).

The second limitation comprises receiving said selected wavelength of light .from said first location at said second location and recovering said NRZ data stream (see, e.g., Fig. 4, ONU 20, and pg. 11, ln. 25 - pg. 12, ln. 6).

The third limitation comprises receiving a second NRZ data stream having said first clocking frequency at said

second location (see, e.g., Fig. 4, ONU 20; pg. 12, ll. 22-27, receiving an example 25 MHz NRZ data stream).

The fourth limitation comprises converting said second NRZ data stream to a Manchester coded data stream at a second clocking frequency which is a selected multiple of said first clocking frequency (see, e.g., Figs. 5A - 5D; pg. 13, ll. 3-10; pg. 14, ll. 19-23, providing example Manchester coded data having frequencies of 50 MHz and 75 MHz).

The fifth limitation comprises transmitting said Manchester coded data stream from said second location to said first location by said optical fiber at said selected wavelength of light (see, e.g., Fig. 4, ONU 20, fiber 42A and HDT 18; pg. 14, ln. 23 - pg. 15, ln. 2).

The sixth limitation comprises receiving said Manchester coded data stream at said first location (see, e.g., Fig. 4, HDT 18, photodiode 55; pg. 14, ln. 26 - pg. 15, ln. 2).

The last limitation comprises converting said Manchester coded data stream to an NRZ data stream having said first frequency (see, e.g., pg. 15, ll. 2-4).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Did the Examiner err in concluding that Claims 3, 4, 6, 7, 10, and 12-20 were obvious under 35 U.S.C. §103(a) in view of the combination of U. S. Patent No. 5,459,607 issued to Fellows, et al. and U.S. Patent No. 5,491,474 issued to Neidlinger, et al. and U.S. Patent No. 5,719,904 issued to Kim?

2. Did the Examiner err in concluding that Claim 11 was obvious under 35 U.S.C. §103(a) in view of the combination of U. S. Patent No. 5,459,607 issued to Fellows, et al. and U.S. Patent No. 5,491,474 issued to Neidlinger, et al. and U.S. Patent No. 5,719,904 issued to Kim and U.S. Patent No. 5,896,211 issued to Watanabe?

3. Did the Examiner err in concluding that Claim 21 was obvious under 35 U.S.C. §103(a) in view of the combination of U. S. Patent No. 5,459,607 issued to Fellows, et al. and U.S. Patent No. 5,491,474 issued to Neidlinger, et al.?

ARGUMENT

1. Claims 3, 4, 6, 7, 10, and 12-20 stand rejected under 35 U.S.C. §103(a) as being obvious over Fellows, et al. in view of Neidlinger, et al. and further in view of Kim. According to M.P.E.P. §2143, to establish a prima facie case of obviousness, three criteria must be met. First, there must be some suggestion or motivation to combine the references. Second, there must be a reasonable expectation of success. Third, the prior art combination of references must teach or suggest all the claim limitations. The Examiner has not established that any criteria for a prima facie case of obviousness has been met in this instance.

First, there is no suggestion or motivation in the Fellows, et al., Neidlinger, et al., and Kim patents to combine them as proposed by the Examiner. The Fellows, et al. patent is directed to a synchronous optical digital transmission system that uses a Manchester line code instead of a NRZ line code for both low speed and high speed channel encoding and decoding of an optical signal. The Neidlinger, et al. patent is directed to a passive optical telecommunications system that intensity modulates an emitted light with a scrambled NRZ baseband signal for downstream communications and intensity modulates an emitted light with an electrical carrier signal that has been DPSK modulated with a useful signal. The Kim patent is directed to a data restoring circuit in a wireless communication system that uses a majority voting method. The Examiner has not cited any language within the Fellows, et al., Neidlinger, et al. or Kim patents that would suggest any capability for them to be combined. In fact, no objective reasoning whatsoever was provided by the Examiner for combining the references as has been proposed other than through an improper hindsight

reconstruction of the claimed invention. The Examiner has merely provided conclusory "it would have been obvious to combine" statements using improper hindsight reconstruction without any support for such conclusory statements from any of the cited references. A statement that modifications of the prior art to meet the claimed invention would have been well within the ordinary skill of the art at the time the claimed invention was made because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. See M.P.E.P. 2143.01. The Examiner has only provided subjective reasoning to support the rejections of the claims. The Examiner has failed to provide any objective reasoning based on the disclosures of the cited art to combine the cited art as has been proposed.

In addition, the majority voting method of the Kim patent has no relationship whatsoever with the optical systems of the Fellows, et al. and Neidlinger, et al. patents. In fact, the Kim patent is concerned with a wireless communication system as opposed to an optical communication system of the Fellows, et al. and Neidlinger, et al. patents. The Examiner has not shown how and where the majority voting method of the Kim patent can be implemented within either of the Fellows, et al. or Neidlinger, et al. patents or why its implementation would beneficial to those optical systems. Accordingly, the only conclusion that can be surmised is that the Examiner is merely taking isolated bits and pieces of various unrelated patents in an improper hindsight attempt to reconstruct the claimed invention.

Moreover, the proposed modification changes the principle of operation of the prior art being modified. The Fellows, et

al. patent specifically teaches away from the use of NRZ line coding in proposing its use of Manchester coding and its advantages at desired low speed and high speed clock frequencies. Placing the NRZ coding of the Neidlinger, et al. patent into the Manchester coding system of the Fellows, et al. patent would totally defeat the purpose of what the Fellows, et al. patent is trying to accomplish at its desired frequencies. Thus, the principle of operation of the Fellows, et al. patent with the Neidlinger, et al. patent would be improperly changed by incorporating their respective teachings. The Examiner has yet to explain how the Fellows, et al. patent and the Neidlinger, et al. patent can be combined in view of such different functionalities. Therefore, Applicant respectfully submits that the Examiner has failed to establish the first criteria for a prima facie case of obviousness.

Further, the use of NRZ coding of the Neidlinger, et al. patent in the system of the Fellows, et al. patent would render the system of the Fellows, et al. patent unsatisfactory for its intended purpose. The Fellows, et al. patent specifically shows that it is trying to obtain low energy component characteristics in areas outside of its low and high speed frequencies of operation. This is accomplished with Manchester coding for both the low speed data and the high speed data. However, as shown in the Fellows, et al. patent, the use of NRZ coding introduces high energy component characteristics in areas outside of the desired low and high speed frequencies of operation. The Fellows, et al. patent is specifically trying to avoid such an operating scenario. As a result, the Fellows, et al. patent lacks any suggestion to use NRZ coding for the transmission and reception of high speed and low speed data at any time. The Examiner's position

otherwise is misplaced and not supported by the Fellows, et al. patent. Thus, the Examiner's proposed modification of the Fellows, et al. patent with the NRZ coding of the Neidlinger, et al. patent would place high energy component characteristics in areas outside of the desired frequencies, rendering the Fellows, et al. unsatisfactory for its intended purpose. As a result, there cannot be a suggestion or motivation to make the proposed modification.

Based on the above comments, there is no suggestion or motivation as supported by objective evidence to combine the cited art as has been proposed, the proposed modification of the cited art changes its principle of operation, and the proposed modification renders the cited art unsatisfactory for its intended purpose. As a result, the Examiner's burden to establish the first criteria of a prima facie case of obviousness has not been met.

Second, a reasonable expectation of success has not been shown by the Examiner. The combination of the Fellows, et al., Neidlinger, et al., and Kim patents would not be capable of performing the operation required by the claimed invention. There is no showing by the Examiner that the functions of any of the Fellows, et al., Neidlinger, et al. and Kim would be able to operate in a single system. There has also been no showing that the combined references would even be able to perform the functionality of the claimed invention related to converting between NRZ coded data and Manchester coded data in an optical transmission system. The proposed combination attempts to combine incompatible processing techniques that have not been shown to be capable of operating according to any degree of predictability. The Examiner, without the improper hindsight look through the claimed invention, has not addressed how the proposed combination of the Fellows, et al.,

Neidlinger, et al., and Kim patents would have any success whatsoever let alone a reasonable expectation of success. Therefore, Applicant respectfully submits that the Examiner has failed to establish the second criteria for a prima facie case of obviousness.

Third, the Examiner has not shown that the proposed Fellows, et al. - Neidlinger, et al. - Kim combination teaches or suggests all of the claim limitations. For example, Independent Claims 3 and 7 recite in general an ability to receive a second NRZ data stream having a first clocking frequency at a second location, convert the second NRZ data stream to a Manchester coded data stream at a second clocking frequency which is a selected multiple of the first clocking frequency, transmit the Manchester coded data stream from the second location to the first location by an optical fiber at a selected wavelength of light, receive the Manchester coded data stream at the first location, and convert the Manchester coded data stream to an NRZ data stream having the first frequency. Moreover, Independent Claims 3 and 7 include having the second clocking frequency being three times the first clocking frequency and voting among three pulses of the Manchester coded data stream to determine two equivalent pulses. By contrast, none of the Fellows, et al, Neidlinger, et al. and Kim patents include any disclosure associated with converting between a NRZ coded data stream and a Manchester coded data stream, let alone at a second clocking frequency three times that of a first clocking frequency, as provided by the claimed invention. The Fellows, et al. patent uses Manchester coding instead of NRZ coding. The Neidlinger, et al. patent uses NRZ coding in one transmit direction and does not mention Manchester coding. The Kim patent does not mention either NRZ coding or Manchester coding. Though the

Examiner has stated what each of the cited patents discloses, there has not been performed a limitation by limitation comparison of the claims to the prior art that shows how each claim limitation is shown in the prior art during the examination of this Application. Moreover, the majority voting method of the Kim patent performs a three bit to one bit operation as opposed to the three pulse to two pulse technique of the claimed invention.

Independent Claims 12 and 16 recite in general an ability to transmit over an optical fiber in a first direction first digital data in a first data code at a first clock frequency and at a first wavelength, convert second digital data in the first data code to a second data code at a second clock frequency, the second clock frequency a multiple of the first clock frequency, transmit over the optical fiber in a second direction the second digital data in the second data code at the second clock frequency and at the first wavelength, and convert the second digital data from the second data code to the first data code. By contrast, none of the Fellows, et al. Neidlinger, et al., nor Kim patents disclose converting second digital data between a first data code and a second data code as provided by the claimed invention. The Fellows, et al. patent merely discloses a single Manchester coding/decoding of data. The Neidlinger, et al. patent merely discloses a single NRZ coding of data in one transmission direction. The Kim patent does not mention line coding of data. The Examiner has not provided any citation to the cited patents that the above operations performed by the claimed invention are disclosed therein. The Examiner makes only two citations to the Fellows, et al. patent but neither citation mentions the limitations of the claimed invention.

Independent Claims 17 and 20 recite in general an ability to transmit over the optical fiber in a first direction and at a first wavelength first digital data in a first data code, convert second digital data in the first data code to a second data code so that the power spectrum of the second digital data in the second data code is substantially separated from the power spectrum of the first digital data in the first data code, for each data bit of the second digital data in the first data code, including multiple corresponding data bits in the second digital data in the second data code, transmit over the optical fiber in a second direction and at the first wavelength the second digital data in the second data code, and convert the second digital data from the second data code to the first data code. By contrast, none of the Fellows, et al. Neidlinger, et al., nor Kim patents disclose converting second digital data between a first data code and a second data code as provided by the claimed invention. The Fellows, et al. patent merely discloses a single Manchester coding/decoding of data. The Neidlinger, et al. patent merely discloses a single NRZ coding of data in one transmission direction. The Kim patent does not mention line coding of data. The Examiner has not provided any citation to the cited patents that the above operations performed by the claimed invention are disclosed therein. The Examiner makes only two citations to the Fellows, et al. patent but neither citation mentions the limitations of the claimed invention.

As shown above, none of the cited patents perform the conversion function provided by the claims. Thus, the Examiner has failed to establish the third criteria for a prima facie case of obviousness.

As a result of the improper combination of the references, the lack of any expectation of success for the

combination, and the lack of disclosure in the patents being combined by the Examiner, there is an insufficient basis to support the rejection of the claims.

2. Claim 11 stands rejected under 35 U.S.C. §103(a) as being obvious over Fellows, et al. in view of Neidlinger, et al. and Kim and further in view of Watanabe. Independent Claim 7, from which Claim 11 depends, has been shown above to be patentably distinct from the proposed Fellows, et al. - Neidlinger, et al. - Kim combination. Moreover, the Watanabe patent does not include an additional disclosure combinable with any of the Fellows, et al., Neidlinger, et al., and Kim patents that would be material to patentability of these claims. For reasons discussed above, a prima facie case of obviousness has not been established with respect to Claim 11.

3. Claim 21 stands rejected under 35 U.S.C. §103(a) as being obvious over Fellows, et al. in view of Neidlinger, et al. As stated above, the first and second criteria for a prima facie case of obviousness have not been established by the Examiner. Moreover, Independent Claim 21 includes similar limitations found in Independent Claims 3 and 7 that have been shown to not be disclosed in the cited art. Thus, for similar reasons, the third criteria for a prima facie case of obviousness has not been established with respect to Independent Claim 21.

CONCLUSION

Applicant has clearly demonstrated that the present invention as claimed is clearly distinguishable over all the art cited of record, either alone or in combination, and satisfies all requirements under 35 U.S.C. §§101, 102, and 103, and 112. Therefore, Applicant respectfully requests the Board of Patent Appeals and Interferences to reverse the final rejection of the Examiner and instruct the Examiner to issue a notice of allowance of all claims.

The Commissioner is hereby authorized to charge any fees or credit any overpayments to Deposit Account No. 02-0384 of BAKER BOTTS L.L.P.

Respectfully submitted,
BAKER BOTTS L.L.P.
Attorneys for Applicant

Charles S. Fish
Reg. No. 35,870

August 29, 2005

Correspondence Address:
2001 Ross Avenue, Suite 600
Dallas, TX 75201-2980
(214) 953-6507
Customer Number: 05073

CLAIMS APPENDIX

1. (Cancelled)

2. (Cancelled)

3. (Previously Presented) A method of transmitting bidirectional communication data over a single optical fiber comprising the steps of:

transmitting a first NRZ data stream having a first clocking frequency from a first location to a second location by said optical fiber using a carrier having a selected wavelength of light;

receiving said selected wavelength of light from said first location at said second location and recovering said NRZ data stream;

receiving a second NRZ data stream having said first clocking frequency at said second location;

converting said second NRZ data stream to a Manchester coded data stream at a second clocking frequency which is a selected multiple of said first clocking frequency;

transmitting said Manchester coded data stream from said second location to said first location by said optical fiber at said selected wavelength of light;

receiving said Manchester coded data stream at said first location; and

converting said Manchester coded data stream to an NRZ data stream having said first frequency;

wherein said second clocking frequency is three times (3x) said first clocking frequency, and said Manchester coded data stream includes three (3) pulses for each data bit and further comprising voting said three (3) pulses to determine at least two (2) equivalent pulses and providing an output NRZ data bit at said first frequency equivalent to said at least two (2) equivalent Manchester data bits.

4. (Previously Presented) The method of claim 3 wherein said first clocking frequency is about 25 MHZ.

5. (Cancelled)

6. (Previously Presented) The method of claim 3 and further including the step of filtering said first NRZ data stream with a low pass filter prior to said transmitting step.

7. (Previously Presented) Apparatus for transmitting bidirectional communication data over a single optical fiber comprising:

a first data source for providing a first electrical digital data stream coded as an NRZ data stream and at a selected clocking pulse rate;

a first light generator at a first location for generating light at a selected wavelength, said light generator connected to said first data source for receiving said NRZ coded data stream and for modulating light generated by said first light generator with said NRZ coded data;

an optical fiber extending from said first location to a second location for transmitting bidirectional light there between;

a first light detection device at said second location for receiving said light modulated by said NRZ coded data stream and for recovering said NRZ coded electrical digital data stream;

a second data source for providing a second electrical digital data stream coded as an NRZ data stream at said selected clocking pulse rate;

a source for providing clocking pulses at said selected clocking pulse rate;

a clock multiplier for multiplying said selected clocking pulse rate at least three times (3x);

a Manchester coding device connected to said clock multiplier for receiving said NRZ coded data stream and for converting said NRZ coded data stream at said selected clocking pulse rate to a Manchester coded data stream having pulses at a clocking pulse rate at least three times (3x) said selected clocking pulse rate;

a second light generator at said second location for generating light at said selected wavelength, said second light generator connected for receiving said Manchester coded electrical digital data stream and for modulating light generated by said second light generator with said Manchester coded data stream;

a second light detection device at said first location for receiving said light modulated by said Manchester coded electrical digital data stream and for recovering said Manchester coded electrical digital data stream; and

a Manchester decoding device for receiving said Manchester coded electrical digital data stream and converted said received data stream to an NRZ coded data stream at said selected clocking pulse rate;

wherein said Manchester coded data stream includes three (3) pulses for each data bit and the Manchester decoding device is adapted to vote said three (3) pulses to determine at least two (2) equivalent pulses and provide an output NRZ data bit at said selected clocking pulse rate equivalent to said at least two (2) equivalent Manchester data bits.

8. (Cancelled)

9. (Cancelled)

10. (Previously Presented) The apparatus of claim 7 and further including a first low pass filter between said first data source and said first generator and a second low pass filter located after said first light detection means.

11. (Original) The apparatus of claim 10 and further including a first band pass filter between said Manchester coding device and said second light generator and a second band pass filter between said second light detection device and said Manchester decoding device.

12. (Previously Presented) A method of bidirectional communication over a single optical fiber comprising the steps of:

transmitting over the optical fiber in a first direction first digital data in a first data code at a first clock frequency and at a first wavelength;

converting second digital data in the first data code to a second data code at a second clock frequency, the second clock frequency a multiple of the first clock frequency;

transmitting over the optical fiber in a second direction the second digital data in the second data code at the second clock frequency and at the first wavelength; and

converting the second digital data from the second data code to the first data code by setting each bit of the second digital data in the first data code equal to a majority of corresponding bits of the second digital data in the second data code.

13. (Previously Presented) The method of claim 12, wherein:

the step transmitting over the optical fiber in a first direction first digital data in a first data code at a first clock frequency comprises the step of transmitting NRZ data; and

the step of transmitting over the optical fiber in a second direction the second digital data in the second data code at the second clock frequency comprises the step of transmitting Manchester coded data.

14. (Previously Presented) The method of claim 13, wherein the second clock frequency is three times the first clock frequency, and the Manchester coded data includes three bits for each bit of second digital data in the first data code.

15. (Previously Presented) The method of claim 14, wherein the step of converting the second digital data from the second data code to the first data code by setting each bit of the second digital data in the first data code equal to a majority of corresponding bits of the second digital data in the second data code comprises the step of voting the three bits to determine at least two equivalent bits and providing an output NRZ data bit at the first clock frequency equivalent to the at least two equivalent bits.

16. (Previously Presented) A system for bidirectional communication over a single optical fiber comprising:

means for transmitting over the optical fiber in a first direction first digital data in a first data code at a first clock frequency and at a first wavelength;

means for converting second digital data in the first data code to a second data code at a second clock frequency, the second clock frequency a multiple of the first clock frequency;

means for transmitting over the optical fiber in a second direction the second digital data in the second data code at the second clock frequency and at the first wavelength; and

means for converting the second digital data from the second data code to the first data code by setting each bit of the second digital data in the first data code equal to a majority of corresponding bits of the second digital data in the second data code.

17. (Previously Presented) A method of bidirectional communication over a single optical fiber comprising the steps of:

transmitting over the optical fiber in a first direction and at a first wavelength first digital data in a first data code;

converting second digital data in the first data code to a second data code so that the power spectrum of the second digital data in the second data code is substantially separated from the power spectrum of the first digital data in the first data code;

for each data bit of the second digital data in the first data code, including multiple corresponding data bits in the second digital data in the second data code;

transmitting over the optical fiber in a second direction and at the first wavelength the second digital data in the second data code; and

converting the second digital data from the second data code to the first data code by setting each corresponding data bit of the second digital data in the first data code equal to a majority of equivalent bits in the multiple corresponding data bits in the second data code.

18. (Previously Presented) The method of claim 17, wherein:

the step transmitting over the optical fiber in a first direction first digital data in a first data code comprises the step of transmitting NRZ data at a first clock frequency; and

the step of transmitting over the optical fiber in a second direction the second digital data in the second data code comprises the step of transmitting Manchester coded data at a second clock frequency.

19. (Previously Presented) The method of claim 18, wherein the step of converting the second digital data from the second data code to the first data code by setting each corresponding data bit of the second digital data in the first data code equal to a majority of equivalent bits in the multiple corresponding data bits in the second data code comprises the step of the voting the three bits to determine at least two equivalent bits and providing an output NRZ data bit at the first clock frequency equivalent to the at least two equivalent bits.

20. (Previously Presented) A system for bidirectional communication over a single optical fiber comprising the steps of:

a first transmitter circuit configured to transmit over the optical fiber in a first direction and at a first wavelength first digital data in a first data code;

a first converting circuit configured to covert second digital data in the first data code to a second data code so that the power spectrum of the second digital data in the second data code is substantially separated from the first digital data in the first data code and to include multiple corresponding data bits in the second digital data in the second data code;

a second transmitter circuit configured to transmit over the optical fiber in a second direction and at the first wavelength the second digital data in the second data code; and

a receiver circuit configured to receive the second digital data in the second data code and convert the second digital data from the second data code to the first data code by setting each corresponding data bit of the second digital data in the first data code equal to a majority of equivalent bits in the multiple corresponding data bits in the second data code.

21. (Previously Presented) A method of transmitting bidirectional communication data over a single optical fiber comprising the steps of:

transmitting a first NRZ data stream having a first clocking frequency from a first location to a second location by said optical fiber using a carrier having a selected wavelength of light;

receiving said selected wavelength flight from said first location at said second location and recovering said NRZ data stream;

receiving a second NRZ data stream having said first clocking frequency at said second location;

converting said second NRZ data stream to a Manchester coded data stream at a second clocking frequency which is a selected multiple of said first clocking frequency;

transmitting said Manchester coded data stream from said second location to said first location by said optical fiber at said selected wavelength of light;

receiving said Manchester coded data stream at said first location; and

converting said Manchester coded data stream to an NRZ data stream having said first frequency.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

None

CERTIFICATE OF SERVICE

None